

What is claimed is:

1. An interface device for interfacing a user with a computer, the computer running an application program and generating a graphical image and a graphical object, the interface device comprising:

a user manipulatable object in communication with the computer;
a sensor to detect a manipulation of the object, the sensor providing a signal to the computer to control the graphical image; and
an actuator adapted to provide a haptic sensation to the palm of the user in relation to an interaction between the graphical image and the graphical object, the actuator comprising a member that is deformable to provide the haptic sensation.

2. An interface device according to claim 1 wherein the member is bowed to provide the haptic sensation.

3. An interface device according to claim 1 wherein the member is biased away from the palm of the user.

4. An interface device according to claim 1 wherein the graphical image is a graphical hand and wherein the haptic sensation is provided to the user when the graphical hand grasps the graphical object.

5. An interface device according to claim 1 wherein the user manipulatable object comprises an instrumented glove.

6. An actuator for providing a haptic sensation to a user interfacing with a computer running an application program, the actuator comprising:

a deformable member having a first end, a second end, and an intermediate portion; and

a tendon capable of displacing the first end relative to the second end in response to the computer to cause the intermediate portion to contact the user and thereby provide a haptic sensation to the user.

7. An actuator according to claim 6 wherein the deformable member is a leaf spring.

8. An actuator according to claim 6 wherein the tendon passes through a guide member fixed to the first or second end of the deformable member.

5 9. An actuator according to claim 6 wherein the deformable member is capable of providing a controllable kinesthetic force to the user.

10 10. An actuator according to claim 6 wherein the deformable member is capable of providing a tactile sensation to the user.

11. A mouse for interfacing a user with a computer generating a graphical environment comprising a graphical hand, the mouse comprising:

a housing;

15 a position detector to detect a position of the mouse, the position detector capable of providing a first position signal to the computer to control the position of the graphical hand in the graphical environment; and

20 a finger position detector to detect a position of a finger of the user, the finger position detector capable of providing a second position signal to the computer to control a graphical finger on the graphical hand in relation to the position of the finger of the user.

25 12. A mouse according to claim 11 further comprising an actuator capable of providing a haptic sensation to the finger of the user.

13. A mouse according to claim 12 wherein the actuator comprises a deformable member.

14. A mouse according to claim 11 further comprising a position detector for each finger on the hand of the user.

30 15. A mouse according to claim 11 wherein the finger position detector comprises a button on the mouse.

16. A mouse according to claim 15 wherein the button comprises first and second sensing portions.

17. A mouse for interfacing a user with a computer, the mouse comprising:
a housing;
a position detector to detect a position of the mouse;
5 a member adapted to contact a finger of the user, the member being
capable of being moved by the finger in two directions; and
a member position detector to detect a position of the member.
18. A mouse according to claim 17 wherein the member position detector is
10 an analog sensor.
19. A mouse according to claim 17 further comprising a second member
adapted to contact a second finger and a second member position detector.
20. A method for interfacing a user with a computer running an application
15 program, the computer generating a graphical environment comprising a graphical hand, the
method comprising:
providing a mouse in communication with the computer;
detecting a position of the mouse;
20 controlling the position of the graphical hand in relation to the detected
position of the mouse; and
controlling a shape of the graphical hand in relation to an amount of
manipulation of the mouse.
21. A method according to claim 20 further comprising providing a haptic
25 sensation to the user in relation to the interaction of the graphical hand with a graphical object.
22. A method according to claim 20 wherein the manipulation of the mouse
results from the movement of a finger of the user.
23. A method according to claim 22 wherein the shape of the graphical hand
30 is related to the movement of the finger of the user.

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24. A method according to claim 22 further comprising controlling the shape of the graphical hand in relation to the movement of a second finger of the user.

25. A method according to claim 20 wherein the mouse is movable in three dimensions.

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